CHPS: Status Update

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Semi-Annual HIC Meeting

30 January 2007

Agenda

- Last HIC Conference: Approach for upcoming projects
- Progress summary since July 2006
- Status updates:
  - ResSim
  - CHPS Realization Plan
  - CHPS FEWS Pilot
  - HydroXC
  - Model Expansion
- AWIPS II coordination
- OHD science prototypes
- Next steps

Last HIC Conference: Approach For Upcoming Projects

- Use ResSim opportunity to build-in CHPS
  - ResSim project
- Lay out roadmap of projects with CHPS built-in
  - CHPS Realization Plan
- Determine if Delft-FEWS can host NWSRFS
  - Delft-FEWS pilot
- Continue Hydrology XML Consortium
  - HydroXC phase 3
- Acquire new COTS models for NWSRFS
  - Model expansion

Progress Summary since July 2006

- ResSim (Apex, Delft)
  - Phase 1 Conceptual Design complete
- CHPS Realization Plan (Apex)
  - Complete
- Delft-FEWS Pilot (RTi, Delft)
  - Phase 1 Concepts and Plan complete
  - Phase 2 implementation begun
- HydroXC (Apex)
  - Phase 3 begun
- Model Expansion
  - SOBEK model acquired for HSMB evaluation
- Other
  - Arrival of new on-site SOA expert (Sudha Rangan, RSIS)
  - Began discussions with Raytheon on AWIPS II vis-à-vis CHPS

ResSim: Status Update

Project Description

- Enhance and put USACE's HEC Reservoir Simulation (ResSim) model into operational use; also connect to NWSRFS
- Integrate ResSim model into CNRFC operations without directly integrating software within NWSRFS code
- Make all ResSim upgrades easily and quickly available to CNRFC

Three year joint HEC-OHD effort 2006 – 2009

- HEC to provide enhancements to ResSim in two phases (deterministic and probabilistic)
- OHD to provide SOA-based "portal" between NWSRFS and ResSim
  - Solution must work in current CNRFC operational environment (AWIPS)
  - Solution should be CHPS-ready for future operational environment (SOA; use Delft-FEWS)

Funded by Yuba County Water Agency

NWS Task Manager: Rob Hartman, CNRFC

ResSim: Status Update (cont'd)

HEC Progress

- Phase 1 – Enhancements to ResSim basic deterministic functionality
  - Work Order 1, Task 1: Develop design for enhancements
    - ***Completed 1 November***
  - Work Order 2, Tasks 2-12: Implement features designed in Work Order 1
    - HEC just beginning Work Order 2
- Phase 2 – Enhancements to support ensembles
  - Work Order 3, Task 13: Design ensemble features
  - Work Order 4, Tasks 14-17: Implement features designed in Work Order 3

ResSim: Status Update (cont'd)

OHD Progress

- Contract with Apex & Delft
  - Begun 1 June
  - Phase 1: Develop conceptual design
  - Phase 2: Implement
- Phase 1
  - "Discovery Engagement" with HEC, CNRFC in August
  - Apex-Delft technical recommendations to OHD in October
  - ***Final CONOPS, Plan delivered to OHD in December***
  - ***HOSIP Gate 1 passed January***
  - HOSIP Gate 2/3 (combined) on 21 February
- Phase 2
  - SOO submitted to contracts December
  - Implementation work beginning January
  - Target completion date: July 2007

CHPS Realization Plan: Status Update

- Formerly referred to as “Road Map”
- Secured participation of CHPS Acceleration Team (CAT)
  - CAT formed January 2006
  - NWRFC, NCRFC, CNRFC, ABRFC
  - OHD Senior Scientist
- Contract with Apex
  - Begun 3 July
  - 1st meeting in Kansas City 10 July (last HIC Conference)
  - Monthly conference calls in August, September, October

CHPS Realization Plan: Status Update (cont'd)

- 18 September – ***new direction***
  - Finding: NWSRFS infrastructure not a part of CAT's vision for future operations
  - Look outside OHD for ready-made alternatives
    - Consider Delft FEWS; arrange demo
- 16 October – Delft-led demo of FEWS to CAT
  - Conclusion: promising option
  - Recommendation: put together a focused FEWS-based pilot system running in NWS environment at selected RFC(s)

CHPS Realization Plan: Status Update (cont'd)

- December – Realization Plan ***complete***; Highlights:
  - By June 2007: Provide limited demonstration of FEWS at one or two RFCs
  - By June 2007: Demonstrate FEWS as part of ResSim solution at CNRFC
  - By January 2008: Assess suitability of FEWS as the modeling infrastructure software for RFCs
  - By July 2008: Define broader requirements for new forecasting environment
    - Collaborate with Raytheon on integration of CHPS with AWIPS II
  - By December 2008: Test first baseline CHPS for 2-3 RFCs (note: already too late for AWIPS OB8 baseline!)
  - January – September 2009: Full roll-out for first baseline CHPS to all RFCs (AWIPS OB9 schedule not confirmed)

CHPS FEWS Pilot: Status Update

- Approach
  - Engage Delft via RTi contract to develop the pilot
  - Leverage RTi NWSRFS knowledge/experience
  - Demonstrate viability of FEWS in an NWS RFC environment
    - Purpose is to demonstrate complete forecast model thread on representative river basins
    - Purpose is NOT to compare FEWS results with NWSRFS
    - Accomplish in a short time
    - Develop as little throw-away code as possible (maximize re-use)
  - Keep all CAT members in the loop
    - Monthly status reports
    - All members to attend final demo
    - Use HOSIP Gate reviews to gain insight into technical details
  - Conduct risk reduction activities
    - Create OHD development team
    - Monitor AWIPS II developments
    - Arrival of new RTi Program Manager Silver Spring – Saud Amer

CHPS FEWS Pilot: Status Update (cont'd)

Delft-RTi activities

- Contract begun 26 September
- Phase 1 - ***Complete***
  - Define key minimum requirements for demo system
  - Select basins for demo
    - NWRFC: Santiam River
    - NCRFC: Red River, Buffalo River
  - Develop conceptual solution and implementation plan
  - Passed HOSIP Gate 2/3 24 January
- Phase 2
  - Implement - underway
  - Demo at NWRFC in April 2007

CHPS FEWS Pilot: Status Update (cont'd)

Risk Reduction: OHD Development Team activities

- Team composition
  - Lead: Sudha Rangan, RSIS. Multi-year practical SOA expertise
  - Two other part-time developers (shared with other OHD projects)
- Integrate new Frozen Ground SAC-SMA model ("Heat Transfer" version) into FEWS Pilot. Advantages:
  - Develops FEWS experience in-house; enables OHD to evaluate quality of contractor-developed software
  - Demonstrates ease with which OHD science prototypes can be integrated into operations
  - Provides enhanced functionality at demo sites

CHPS FEWS Pilot: Status Update (cont'd)

Risk Reduction: OHD Development Team activities

- Current status
  - Software coding to connect original Fortran-based OHD model to FEWS ***complete***
  - FEWS loaded on OHD system - integration tests underway
  - Next: port Fortran prototype model code to Java
    - Re-use SAC-SMA Java code already in use in SSHP
    - SSHP code highly modular, so new model code easily integrated
    - Due date 16 February – on track

CHPS FEWS Pilot: Status Update (cont'd)

Risk Reduction: Monitor AWIPS II developments

- Ensure participation of FEWS Pilot Team Lead (Sudha) in AWIPS II activities
- Install AWIPS Development Environment (ADE) locally, as Raytheon delivers capabilities (Oct 2006 – June 2007)
  - Conduct independent assessment of ADE capabilities
  - Provide Raytheon ADE developers with feedback for corrections and improvements
  - Begin analysis of possible integration points with CHPS
- Attended Raytheon's first ADE training last week (1/23 - 1/25): Sudha, Chip, Hank

(See later slide for more details on AWIPS II status)

CHPS FEWS Pilot: Status Update (cont'd)

Final capabilities planned for pilot system:

- Snow model – use existing Delft model, such as a degree-day model (as placeholder)
- SAC-SMA model – port the latest OHD frozen ground model to FEWS
- Unit hydrograph operation – use Delft existing
- Routing model – use Delft SOBEK model (configured on the Red River Basin)
- Reservoir model – use simple Delft reservoir model that can reasonably mimic basic functionality currently implemented in an existing SSARR, RES-SNGL or RES-J model
- Include functionality provided by ADD/SUB and ADJUST-Q

CHPS FEWS Pilot: Status Update (cont'd)

Next steps beyond the pilot

- NWRFC and NCRFC to run FEWS May through December 2007
- CNRFC to run FEWS as part of ResSim solution beginning June 2007
- Regular conference calls with demo sites to review usability, functionality, issues, etc.
- Develop "success criteria": how OHD decides whether to adopt FEWS as the successor to NWSRFS for its river forecasting infrastructure
- Final assessment on adoption of FEWS
- Begin requirements process, per the Realization Plan

HydroXC: Status Update

Phase 3 Goals

- Develop & publish version 3.0 of schema with more detailed sub-schema templates for common data objects
- Develop adapter capable of reading and writing SHEF messages and generating HydroXC-compliant XML (examine suggestion from SR for E-19 data sharing)
- Continue to foster collaboration with similar organizations such as CUASHI

Progress & Status

- December
  - Phase 3 kick-off meeting held on 1 December
- Visit http://www.nws.noaa.gov/ohd/hydroxc/index.html
  - Site to be moved to www.hydroxc.org in Q2 FY07
- OHD to provide sponsorship until Consortium gains momentum
  - Apex to continue coordination for Consortium
  - Dr. Michael Piasecki (Drexel University) to take over technical leadership
- Next: Apex to present draft sub-schemas in early February

Model Expansion: Status Update

- Evaluate alternative models
  - HSMB currently evaluating several hydraulic models to supplement FLDWAV & provide RFCs with alternatives
  - Evaluation due to end June 2007
  - Refer to HSMB Hydraulics Group presentation
- Provide the means to access other models
  - HEC ResSim adapter has been designed to provide easy access to other HEC models
  - Models similar to NWSRFS models will be included in the FEWS Pilot (e.g., Delft snow model will be substituted for NWSRFS Snow-17)

AWIPS II: Status Update

- OHD meeting with Raytheon AWIPS II architect on 27 September
  - OHD provided detailed review of NWSRFS architecture & design
  - Raytheon underestimated complexity; seeks OHD help
- AWIPS II:
  - AWIPS Development Environment (ADE) due June 2007
    - All development orgs received 1st training January 2007
    - Follow-up training expected later in the year
  - Raytheon to re-engineer all AWIPS components by late 2009
    - Raytheon is conducting re-engineering analysis NOW

AWIPS II: Status Update (cont'd)

- AWIPS II (cont'd):
  - Raytheon's approach to Hydro:
    - WFO hydro to be fully integrated within ADE/Common AWIPS Visualization Environment (CAVE)
    - Meeting on 10 January with Raytheon revealed approach based on simply re-casting existing NWSRFS (CHPS will provide completely new infrastructure not based on NWSRFS)
    - Future of RFC user interaction within CAVE is unknown
      - Could be part CAVE, part RFC unique
- Continue to monitor AWIPS II progress via ADE deliveries
  - SOA expert (Sudha) currently evaluating ADE in parallel with FEWS

OHD Science Prototypes

- Ensembles
  - Formation of new Experimental Ensembles Forecast System (XEFS) working group
    - XEFS group co-led by CAT member (Rob Hartman)
    - OHD CHPS lead (Chris Dietz) also a member
    - Operational concepts currently being refined
  - XEFS must ultimately be re-architected for CHPS
  - FEWS may already provide some basic tools – OHD to investigate
- Distributed Modeling
  - Continue with NWSRFS-based version through at least end of OB8
  - Time frame for CHPS-based solution yet unknown
    - Modular OB7.2 design will allow maximum code re-use
- Ultimately all new science prototypes must be developed in a CHPS environment

Next Steps

- Continued RFC involvement in evolution of CHPS
- Demonstration in April of FEWS Pilot at NWRFC (report will be provided at next HIC Conference)
- Assessment of FEWS Pilot through operational use later in the year
- End of 2007 - begin definition and prioritization of future CHPS requirements, such as:
  - calibration tools
  - verification tools
  - short, medium, and long-term ensembles processing
  - distributed modeling capability including accommodation for future extensions
  - probabilistic distributed modeling
  - grid editor
  - other (e.g., Index Velocity Ratings)
- Develop a CHPS web page – currently under construction; URL will be available before next HIC Conference

End of Presentation

Comments or Questions?